# OCR A Level Computer Science

## H046/01 Computing Principles

Name:_____ Group: A/G Mark: ___ / 63 Grade: __

**INSTRUCTIONS**

Do not use a calculator. Answer **all** the questions.

**1** A company releases a utility called RAMStore. The utility creates a virtual storage drive from an area of the computer's RAM.

**(a)** Describe what is meant by the term utility software.

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..... **[2]**

**(b)** Give **one** advantage of using RAM as storage in this way.

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..... **[1]**

**(c)** The utility periodically copies what is in the RAM drive to secondary storage, such as a hard disk. Explain why this is necessary.

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**(d)** It is important that enough RAM is left for the operating system to use. Describe a technique that allows operating systems to overcome a lack of available RAM.

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..... **[4]**

**2** * Modern computers tend to have magnetic or solid state (flash) hard drives. Discuss which hard drive you would recommend for a keen video games player to use on their desktop PC.

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..... **[9]**

3 Below are extracts from the ASCII and EBCDIC character sets.

**ASCII**

| Denary Value | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Character | A | B | C | D | E | F | G | H | I | J | K | L | M |
| Denary Value | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| Character | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |

**EBCDIC**

| Denary Value | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | ... | 209 | 210 | 211 | 212 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Character | A | B | C | D | E | F | G | H | I | ... | J | K | L | M |
| Denary Value | 213 | 214 | 215 | 216 | 217 | ... | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 |
| Character | N | O | P | Q | R | ... | S | T | U | V | W | X | Y | Z |

**(a)** Explain, referring to ASCII and EBCDIC, what would happen if computers were to use different character sets when communicating.

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..... **[2]**

**(b)** Write a function that given the denary value of an EBCDIC uppercase letter, returns the denary value of an ASCII uppercase letter. If a value is entered that doesn't correspond to an uppercase EBCDIC letter the function should return -1

e.g.
```
convert(201)   returns
73       convert(209)
returns 74 convert(78)
returns -1
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function convert(ebValue)
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endfunction

**[5]**

4 The following is a program written using the Little Man Computer instruction set.

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start  LDA   one
       OUT
       LDA   zero
       OUT
       LDA   count
       SUB   one
       STA   count
       BRP   start
       HLT
one    DAT   1
zero   DAT   0
count  DAT   3
```

**(a)** Describe the difference between the STA and LDA instructions.

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**(b)** Identify the type of memory addressing the program uses.

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**(c)** State the output this program generates.

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**(d)** Explain the buses and registers used when the line `SUB one` is executed.

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5 A software development company is building an operating system for a mobile phone that is in the process of being designed.

**a.** Give **one** reason the phone needs an operating system.

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**(b)** Explain how the developers could use virtual machines.

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**(c)** One of the developers is responsible for writing the code for what happens when the CPU receives an interrupt. Outline what the code must do.

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**(d)** The developers follow the waterfall lifecycle.

**(i)** List **three** stages of the waterfall lifecycle.

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3..... **[3]**

**(ii)** Justify why the waterfall lifecycle is suited to the development of the operating system.

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..... **[2]**

**(iii)** Give **one** disadvantage of using the waterfall lifecycle to develop the operating system.

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..... **[1]**

**6 (a)** Convert the binary number 01101111 to a hexadecimal number.

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..... **[1]**

**(b)** Convert the denary number −19 to an 8-bit number using:

**(i)** Two's complement representation.

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..... **[1]**

**(ii)** Sign and Magnitude representation.

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..... **[1]**

c) The two values below are stored using unsigned binary. Calculate the subtraction of 01110010 from 11000011. Show your working.

11000011
01110010 –

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**[2]**

7 **(a)** Processors following the Von Neumann Architecture use registers.
**(i)** Describe what is meant by the term ‘register’.

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..... **[2]**

**(ii)** Give **one** other feature of the Von Neumann Architecture.

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..... **[1]**

**(b)** An example of a register is the Accumulator (ACC).
Give a Little Man Computer instruction that will copy the contents of the accumulator into memory when executed.

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..... **[1]**

**(c)** Another register is the Program Counter (PC).
**(i)** State what the Program Counter holds.

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..... **[1]**

**(ii)** Give the name of **two** Little Man Computer instructions that may change the contents of the Program Counter when executed.

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..... **[2]**

**END OF QUESTION PAPER**